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EXAMINER
KUBELIK, ANNE R

ART UNIT	PAPER NUMBER
1638	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/887,038	KAPLAN ET AL.	
	Examiner	Art Unit	
	Anne Kubelik	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-30 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) 1-30 are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6) ☐ Other: .

DETAILED ACTION

1 Claims 1-30 are pending.

2 The specification is objected to because of the following unclear phrase on page 24, line 9, of the specification: "fail to poses a removable transit peptide." A correction in which new matter is not introduced is required.

3. The drawings are objected to for the reasons indicated on the accompanying form PTO 948. Corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. See 37 CFR 1.85(a) and MPEP 608.02(b).

Claim Objections

4. Claim 3, 6 and 19 are objected to because of the following informalities:

"Agrobaterium" in line 3 is misspelled.

In claims 6 and 19 "blosum62" should be replaced with --blosum 62--.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 16-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are drawn to a nucleic acid molecule, which reads on a product of nature, *i.e.*, a DNA fragment as it occurs in an organism.

The nucleic acid molecule, as claimed, has the same characteristics and utility as those found naturally in the genome of *Synechococcus* PCC7942 and therefore does not constitute patentable subject matter. See *American Wood v. Fiber Disintegrating Co.*, 90 U.S. 566 (1974), *American Fruit Growers v. Brogdex Co.*, 283 U.S. 2 (1931), *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 33 U.S. 127 (1948), *Diamond v. Chakrabarty*, 206 USPQ 193 (1980). It is suggested that the claims be modified to refer to the hand of the inventor, *e.g.* by replacing "A" with --An isolated-- or --A purified-- in claim 16.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-30 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for nucleic acids of SEQ ID NO:2, a method of enhancing inorganic carbon fixation in a plant by transformation with a nucleic acid of SEQ ID NO:2, and plants so obtained, does not reasonably provide enablement for nucleic acids that encode a protein that is 70% homologous to the polypeptide of SEQ ID NO:3, a method of enhancing inorganic carbon fixation in a plant by transformation with those nucleic acids, and plants so obtained. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims are broadly drawn to a multitude of DNA molecules from a multitude of sources that have some degree of sequence similarity to SEQ ID NO:2 due to the deletion,

insertion or substitution of an unspecified number of nucleotides or that encode a protein that is 70% homologous to the polypeptide of SEQ ID NO:3 or a "portion" thereof, that hybridize to that portion or that are a variant of that portion, wherein the nucleic acid encodes a protein with bicarbonate transporter activity. The claims are also drawn to a method of enhancing carbon fixation in a photosynthetic organism through transformation with those nucleic acids, and photosynthetic organisms so produced.

The instant specification, however, only provides guidance for cloning the IL-2 gene (SEQ ID NO:2) from *Synechococcus* PCC7942 (pg 44-46), methods of transformation with this nucleic acid (pg 26-39) to produce plants with increased carbon fixation rates (pg 54-56), and methods of measuring photosynthesis and carbon uptake in *Synechococcus* PCC7942 (pg 41-42).

The instant specification fails to provide evidence to demonstrate that the IL-2 gene actually encodes a bicarbonate transporter rather than a transporter for another ion. Hence, the precise function of the IL-2 gene is unclear.

Determining whether a gene whose mutation results in altered CO_2 requirements encodes a bicarbonate transporter is unpredictable. Omata et al (1999, Proc. Natl. Acad. Sci. USA 96:13571-13576) assert that the gene encoded by SEQ ID NO:2 cannot encode a bicarbonate transporter because the phenotype of an *ictB* mutant that had an inactivated version of that gene is incompatible with presumed existence of multiple bicarbonate transporters (pg 13571, end of the 1st paragraph, right column). Omata et al suggest that the gene instead encodes a transporter for ions whose charge compensates for the charge of HCO_3^- (page 13575, middle of the right column).

Omata et al also provide evidence that the proteins encoded by **four** genes act together to form the bicarbonate-transporter of *Synechococcus* (pg 13574). Maeda et al (2000, J. Biol. Chem.

275:20551-20555) teach that one of these proteins specifically binds HCO_3^- (pg 20551, right column, to pg 20554, left column). Thus, not only is it unclear that SEQ ID NO:2 encodes a bicarbonate transporter, but it is also unclear that a single polypeptide, as specified in the claims, can function as a bicarbonate transporter. The instant specification provides no guidance for the coordinate expression of four polypeptides in a plant.

Because the enzymatic identity of the gene of SEQ ID NO:2 remains in question, methods of enhancing carbon fixation via transformation with any gene of unspecified function that is homologous to or is an unspecified variant of the full-length SEQ ID NO:2 are not enabled. Additionally, methods of enhancing carbon fixation via transformation with any gene that comprises portions of SEQ ID NO:2 or variants of portions of SEQ ID NO:2 (as recited in parts (iv) and (v) of claims 5 and 18) read on methods utilizing **any** nucleic acid sequence. As such, the only functional assay for these nucleic acids is that they enhance carbon fixation when transformed into a plant. This constitutes an invitation for experimentation by the practitioner of the invention as claimed, as there is no way to predict from knowledge of the role of the protein encoded by the gene if it will enhance carbon fixation.

Identifying nucleic acids functionally related to a given nucleic acids is highly unpredictable. For example, creating variants of a gene by making "conservative" substitutions (*e.g.*, substituting one polar amino acid for another, or one acidic one for another) is not predictable. Lazar et al (*supra*) showed that the "conservative" substitution of glutamic acid for aspartic acid at position 47 reduced biological function of transforming growth factor alpha while "nonconservative" substitutions with alanine or asparagine had no effect (abstract). Similarly, Hill et al (1998, Biochem. Biophys. Res. Comm. 244:573-577) teach when three histidines that are

maintained in ADP-glucose pyrophosphorylase across several species are substituted with the "nonconservative" amino acid glutamine, there is little effect on enzyme activity, while the substitution of one of those histidines with the "conservative" amino acid arginine drastically reduced enzyme activity (see Table 1). All these mutated proteins, however, would have at least 95% identity to the original protein and the nucleic acids encoding all these mutated proteins would hybridize under high stringency to the nucleic acids encoding the original protein.

No guidance is provided for which amino acids of SEQ ID NO:4 can be altered and to which other amino acids, and which amino acids must not be changed, to maintain the activity of the encoded protein. The specification also fails to provide guidance for which amino acids can be deleted and which regions of the protein can tolerate insertions and still produce a functional enzyme. The specification fails to teach nucleic acids encoding a portion of SEQ ID NO:2, at least 60% identical too said portion, hybridizable with said portion, or variations of said portion, wherein said nucleic acid is functionally related to SEQ ID NO:2, and can be used in the method of enhancing inorganic carbon fixation.

Given the claim breath, unpredictability, and lack of guidance as discussed above, undue experimentation would have been required by one skilled in the art to develop and evaluate methods for enhancing carbon fixation with a gene that encodes a bicarbonate transporter, that encodes a protein that is 70% homologous to the polypeptide of SEQ ID NO:3 or a "portion" thereof, that hybridizes to that portion or that is a variant of that portion. Simply making all possible single amino acid substitutions in a 467 amino acid long protein like that of SEQ ID NO:3 would require making and testing 19^{467} possible "variants", and would therefore constitute undue experimentation.

Lastly, the specification fails to provide guidance for methods of transformation of photosynthetic organisms other than plants. Neither the specification nor the prior art describes transformation procedures for all the multitude of photosynthetic organisms, for example for all the species cyanobacteria and photosynthetic protests.

Therefore, the specification is not enabled throughout the broad scope of the claims.

9. Claims 1-30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are broadly drawn to a multitude of DNA molecules that have 60% sequence similarity to SEQ ID NO:2 or that comprise a portion of any size of SEQ ID No:2, that hybridize to a portion of any size of SEQ ID NO:2, or that comprise any variation of a portion of any size of SEQ ID NO:2. Applicant does not describe other DNA molecules encompassed by the claims, and the structural features that distinguish all such nucleic acids from other nucleic acids are not provided.

More than one protein has the activity described in the specification for the protein encoded by SEQ ID NO:2. There are several very different kinds of bicarbonate transporters. Romero et al (2000, J. Biol. Chem. 275:24552-24559) teach that a Na^+ dependent Cl^--HCO_3^- exchanger, a K^+/HCO_3^- cotransporter and electrogenic and neutral Na^+/HCO_3^- cotransporters are known (see abstract). Additionally, as discussed above, Applicant has not taught that SEQ ID NO:2 encodes a bicarbonate transporter. Thus, Applicant has not definitely described a nucleic acid encoding a bicarbonate transporter at al, much less a genus of said nucleic acids.

As the activity of the instant protein is not described, nucleic acids that hybridize to SEQ ID NO:2 or that encode any protein with bicarbonate transporter activity are not described within the full scope of the claims, and the specification fails to provide an adequate written description of the claimed invention.

Hence, Applicant has not, in fact, described DNA molecules that encode a protein with bicarbonate transporter activity, and the specification fails to provide an adequate written description of the claimed invention.

Therefore, given the lack of written description in the specification with regard to the structural and physical characteristics of the claimed compositions, it is not clear that Applicant was in possession of the genus claimed at the time this application was filed.

See *University of California v. Eli Lilly*, 119 F.3d 1559, 43 USPQ 2d 1398 (Fed, Cir. 1997):

> The name cDNA is not in itself a written description of that DNA; it conveys no distinguishing information concerning its identity. While the example provides a process for obtaining human insulin-encoding cDNA, there is no further information in the patent pertaining to that cDNA's relevant structural or physical characteristics; in other words, it thus does not describe human insulin cDNA .... Accordingly, the specification does not provide a written description of the invention ....

and at pg 1406:

> a generic statement such as "vertebrate insulin cDNA" or "mammalian insulin cDNA," without more, is not an adequate written description of the genus because it does not distinguish the genus from others, except by function. It does not specifically define any of the genes that fall within its definition. It does not define any structural features commonly possessed by members of the genus that distinguish them from others. One skilled in the art therefore cannot, as one can do with a fully described genus, visualize or recognize the identity of the members of the genus. A definition by function, as we have previously indicted, does not suffice to define the genus because it is only an indication of what the genes does, not what it is.

See *Amgen Inc. v. Chugai Pharmaceutical Co. Ltd.*, 18 USPQ 2d 1016 at page 1021:

> A gene is a chemical compound, albeit a complex one, and ... conception of a chemical compound requires that the inventor be able to define it so as to distinguish it from other materials .... Conception does not occur unless one has a mental picture of the structure of the chemical or is able to define it by its method of preparation, its physical or chemical properties, or whatever characteristics sufficiently distinguish it. It is not sufficient to define it solely by it principal biological property, *e.g.*, encoding human erythropoietin, because an alleged conception having no more specificity than that is simply a wish to know the identity of any material with that biological property.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-15, 17- 21 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Dependent claims are included in all rejections.

The term "enhancing" in claims 1 and 16 is a relative term that renders the claims indefinite. The term "enhancing" is not defined by the claim and one of ordinary skill in the art would not be reasonably apprised of the metes and bounds of the invention. The level of inorganic carbon fixation should be compared to that of a nontransformed plant.

In claim 1, the method steps should start with a verb in the gerund form. Thus, "the step of" in line 2 should be deleted. Dependent claim 2 should be amended accordingly.

Claim 1 is indefinite because it lacks agreement between the preamble of the method and the positive method steps. Methods must be circular; the final step must generate the item the method is intended to produce. The method of enhancing carbon fixation in a photosynthetic organism in claim 1 ends in transforming a cell, when it should end in the production of a photosynthetic organism with enhanced carbon fixation.

Claim 1 and 16 are indefinite in their recitation of the phrase "polypeptide having a bicarbonate transporter activity". It is unclear is the polypeptide is a bicarbonate transporter or if it has some other role in transport of bicarbonate. It is suggested that the phrase be replaced with --bicarbonate transporter--.

Claims 5 and 18 recite the limitation "said protein" in part (i) of the claims. There is insufficient antecedent basis for this limitation in the claim.

Claims 5, 15 and 18 are indefinite in the recitation of the word "includes." It is unclear if this word is intended to be open or closed. If open language is intended, the word should be replaced with "comprises."

Claims 5 and 18 are indefinite in the recitation of the phrase "corresponding to" in part (i). It is unclear what correspondence to a portion of a nucleic acid is. The claims are also indefinite for their recitation of "derived" - has the portion been further modified? Lastly, -- wherein-- should be inserted before "said".

Claims 5 and 18 are indefinite in the recitation of the word "hybridizable" in part (iii). It is not clear if hybridization is required. Additionally, the hybridization and wash times are not defined in the claim.

Claims 5 and 18 are indefinite in the recitation of the word "variation" in parts (iv) and (v). The extent of that variation is unclear.

Claims 6 and 19 are indefinite in the recitation of the word "homologous". It is not clear if by this word, Applicant intends the sequences be 70% identical or 670% similar to SEQ ID NO:3.

Claims 6 and 19 are indefinite in their use of the phrase "as determined using the Blast software..." to modify "bicarbonate transporter activity". For purpose of examination it was assumed that the phrase "as determined by Blast software..." was actually intended to modify "70% homologous". Additionally, there is a lack of antecedent basis for the limitation "the Blast software".

Claims 9, 14-15, 21-22 and 27 are not written in proper Markush format. The claims should be in the format "selected from the group consisting of A, B, C and D." All the members of the group should be singular because "plant" in line 1 of claims 9 and 27, "promoter" in the

first line of part (iii) of claims 14 and 21, and "element" in line 2 of claims 15 and 22 are singular. See MPEP § 2173.05(h).

Claims 12 and 15 are indefinite in their recitation of the phrase "further includes". Claim 1 does not recite "includes" so the polynucleotide cannot "further include" something.

Claims 14 and 21 are indefinite in their recitation of the phrase "independently selected", which each recite in parts (i), (ii), and (iii). It is unclear from what the selection of the promoter must be independent. Deletion of "independently" would obviate the rejection.

Claims 15 and 22 are indefinite in their recitation of the word "derived" in lines 8-10. It is not clear what has been done to those virus, plastids and transposable element sequences to make then "derived".

Claim 17 is indefinite in its recitation of the phrase "being upstream to the polynucleotide effective in expressing said polypeptide in a plant". This phrase "effective in expressing said polypeptide in a plant" appears to improperly modify "polynucleotide" rather than "promoter". It is suggested that the promoter be operably linked to polynucleotide.

12. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting an essential element, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted element is a promoter for expression of the polynucleotide. The instant specification states that "the [DNA] constructs of the subject invention will include an expression cassette for expression of the fusion protein of interest" (pg 31, lines 14-15). In addition, given the desire of transforming a plant with an expressible polynucleotide (claim 1, line 3), inclusion of a promoter in the construct is critical to the method. It is suggested that the claims

be modified to include a promoter operably positioned before the gene encoding the bicarbonate-transporter.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

14. Claims 16-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Bonfil et al (1996, GenBank Accession No. U62616).

Bonfil et al disclose a 4957 basepair-long nucleic acid from *Synechococcus* PCC7942 that encodes a gene with putative bicarbonate transporter activity, which would inherently contain a transcription termination signal, a translation start site, and a translation stop site (see sequence search results). The nucleic acid contains several open reading frames running in both directions upstream of the gene encoding the bicarbonate transporter protein, and as such must include several promoters, including one that would work in some part of a plant (see Fig. 1 of the instant specification). The nucleic acid would "correspond to" a portion "derived" from SEQ ID NO:2, would hybridize to said portion would be a variation of said portion, and would encode a protein

that is at least 70% homologous to SEQ ID NO:3. The intended use recited in claim 16 is not given patentable weight in a product claim.

15. Claims 23-27 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Ko et al (US Patent 6,011,198, filed December, 1996).

Ko et al teach transgenic tobacco plants with a rate of photosynthesis 37% higher than that of non-transgenic tobacco plants (column 29, line 25, to column 30, line 67). These plants would inherently comprise a nucleic acid encoding a polypeptide with bicarbonate transporter activity. It is suggested that the claims be amended to indicate that the plants are transformed with the nucleic acid of claim 16.

16. Claims 23-25 and 28-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Gordon-Kamm et al (1990, Plant Cell 2:603-618).

Gordon-Kamm et al teach transgenic maize plants (pg 607), which would inherently comprise a nucleic acid encoding a polypeptide with bicarbonate transporter activity. It is suggested that the claims be amended to indicate that the plants are transformed with the nucleic acid of claim 16.

Double Patenting

17. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

18. Claims 1-30 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 6,320,101. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the issued patent are drawn to methods of enhancing inorganic carbon fixation in plants by transformation with the nucleic acid of SEQ ID NO:3, nucleic acid constructs used in that method and plants so obtained. These claims are species of the genus of claims of the pending application, which are drawn to methods of enhancing inorganic carbon fixation in plants by transformation with a nucleic acid that hybridizes to SEQ ID NO:3 or that encodes a protein with bicarbonate transporter activity, nucleic acid constructs used in that method and plants so obtained. Hence, the claims of the instant application encompass the claims of the issued patent and are obvious in view of the claims of the issued patent.

19. Claims 1-15 and 21 are free of the prior art are free of the prior art, given the failure of the prior art to teach or suggest plant transformation with a bicarbonate transporter gene under the control of a heterologous promoter, and given the unpredictability inherent in the identification and evaluation of plant bicarbonate transporter genes, as discussed above.

Conclusion

20. No claim is allowed.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne R. Kubelik, whose telephone number is (703) 308-5059. The examiner can normally be reached Monday through Friday, 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the patent analyst, Kimberly Davis, at (703) 305-3015.

Anne R. Kubelik, Ph.D.
May 20, 2002

AMY J. NELSON, PH.D
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600